Emergency Services Network: overview

About the Emergency Services Network

The Home Office is leading a pan departmental, cross government programme to deliver the new Emergency Services Network (ESN) critical communications system. This will replace the current Airwave service used by the emergency services in Great Britain.

Customers for the ESN include the police, fire and rescue, and ambulance services as well as a range of other users stretching from local authorities and utility services to first responders like inshore rescue. There are potentially around 300,000 individuals who will depend on ESN, using handheld devices or operating equipment in 50,000 vehicles, 115 aircraft and 200 control rooms.

The software that ESN runs on is being provided by Motorola Solutions and the infrastructure is being built by EE; created by upgrading their existing network, including deploying more 4G radio frequencies in rural areas, and building around 500 new sites. All new sites are open to being shared with other mobile network operators. To maximise coverage for the emergency services the government will build around 300 further sites in the most remote and rural areas of Britain and, potentially, these will also bring much needed commercial coverage to these areas.

ESN represents cutting edge technology and will be the future platform for communications in the emergency services. Delivering this world leading network has presented some challenges. To meet these, delivery of ESN has been refocused in a new and incremental way.

The new focus is on getting the products and services that emergency services customers want, in their hands when they want them. It means key elements of ESN can be tested, adopted and begin to be used as they become available, rather than having to wait until every element of the network is finished.

What ESN will deliver

The strategic aim of the Emergency Services Mobile Communications Programme (ESMCP) is to deliver a much better voice and data service to the emergency services. It will replace the reliable but limited and ageing Airwave system.

ESN will transform emergency services' mobile working, especially in remote areas and at times of network congestion. It will create a single platform for sharing data and imagery and enable faster adoption of successful mobile applications. ESN also represents value for money for the taxpayer through delivering steady state savings of over £200 million per year.

ESN will deliver:

- secure and resilient mission critical communications the emergency services can trust to keep them safe
- a modern voice and data platform which will enable the emergency services to improve front-line operations and work more closely together
- value for money by replacing legacy technology, improving commercial terms and providing a common platform for innovation and data sharing

ESN is being built quickly and deployed quickly and safely to allow Airwave to be switched off as soon as it is no longer needed.

Programme review

A review into ESMCP was completed earlier this year and the decision was taken to go forward and complete the new network, subject to agreement by all other sponsors of the programme.

The review undertook an in-depth and exhaustive analysis of all the benefits and risks of continuing with the programme to give our emergency services the modern communications tools and network they need.

It demonstrated conclusively that ESN is the right strategic choice to replace the existing Airwave network. It also found that ESN represents good value for money for the taxpayer, but that a new direction is needed to ensure that the emergency services benefit from the new network as soon as possible.

How ESN will be delivered

This new culture will help to build secure and resilient mission critical communications that the emergency services can trust to keep them safe. New behaviours will also support the swift and safe deployment of ESN to allow Airwave to be switched off as soon as possible. To deliver this, ESMCP will:

Build confidence in the programme through delivery and deployment of capability that ESN customers trust will keep their people **safe** in the most challenging operational circumstances.

Adopt an incremental approach, which allows for continuous improvement of the solution and learning of lessons along the way - to boost service, enable innovation and meet new needs of the emergency services.

Be coverage led: products can't be deployed until there is sufficient coverage in place for people to use them and so adoption of ESN products will logically follow the coverage roadmap.

Be more customer focussed: the programme team is taking an emergency service-centric approach to design, deployment and adoption of products and services, which meet the needs of users and maximise adoption.

Have greater user involvement - representatives on the programme are becoming more involved in the design and delivery of the ESN products than they have ever been before.

Coverage

The successful provision of coverage is one of the key deliverables of the ESN network, allowing Airwave users to migrate to ESN. The various coverage elements will be delivered by multiple suppliers and contracts but will ultimately be assured by a common, service wide testing and assurance process. The vision is to deliver and assure the coverage that will enable emergency services users to continue to operate effectively, efficiently and safely when Airwave is turned off. The programme has overall responsibility for providing coverage, including all contractual and procurement decision-making.

ESN coverage will be delivered by the following contracts/suppliers:

- the Mobile Services (MS) supplier, EE, delivering the primary coverage.
- ESMCP delivering the coverage required in the defined Extended Area Service (EAS) parameters that fall outside of EE's delivery of the primary coverage area
- ESMCP delivering coverage within the London Underground

EE coverage

EE will provide ESN coverage along major and minor roads, selected buildings, road tunnels and railway facilities, as well as 12 miles out to sea and up to 500 feet above the ground.

EE's delivery of ESN incorporates coverage improvements to their existing commercial 4G network via a programme of site upgrades.

EE have now completed construction of 354 of the new sites needed, with the remaining 111 masts due to be finished shortly.

ESN users will get priority use of the EE 4G network via a dedicated network code and utilise priority radio and core network bearers to access ESN public safety services.

Extended Area Service (EAS)

The Extended Area Service (EAS) programme is responsible for providing ESN coverage in the most remote and rural areas of Great Britain by building a new network of masts. These sites are in addition to those new sites being provided by EE. EAS will extend ESN coverage and transform mobile working for police, fire and rescue, and ambulance crews in the most rural or remote areas of Britain.

Construction started on the first mast in the new EAS network on 1 October 2018 at Boreland, near Lockerbie, in Scotland and was completed at the end of October 2018. Thirteen further sites have entered the build stage. Over the next 6 months another 50 sites are expected to begin construction in the most remote and rural areas of Scotland, Wales and England. The network is due to be complete by the end of 2019. Approximately 292 EAS sites will be required to deliver the coverage. These will be a mix of around 194 new build sites, approximately 18 site shares with other mobile network operators and around 80 Airwave site shares.

Given the remote and rural location of some of this new infrastructure, it may be possible to use it to bring fast 4G commercial services to locations and communities which have previously had poor or no mobile coverage. Subject to local planning authorities granting planning for lattice mast structures which can host multiple Mobile Network Operators (MNOs), many of these EAS sites are also expected to support commercial coverage, where MNOs are interested in doing so.

Where practical, advantage will be taken of other government initiatives such as the Scottish Futures Trust 4G infill project. The provision of the active equipment, its installation and integration for all EAS sites is via EE. The ESN Programme has shared all provisional locations for these mast structures with all 4 of the UK's MNOs. The government is very clear on its responsibilities under the European Commission's State Aid decision taken in December 2015 and understands that a key provision is to provide "wholesale access to new state-funded infrastructure on equal and non-discriminatory terms".

Coverage Assurance

This will give users the ability to assure signal coverage, so they can confirm EE are meeting their contractual obligations. It will provide a common approach for checking coverage required from other ESN projects, for example the Extended Area Service and ESN in London Underground.

EE remain responsible for assuring the contracted coverage delivered in the 'Primary Area'. EE will do this by using various measuring techniques such as calibrated prediction modelling, crowd sourcing techniques and calibrated drive/walk testing.

ESMCP has procured a coverage testing capability with associated reporting and support services called 'ESN Assure', which, in cooperation with the emergency services, will provide a mobile platform for wide-area coverage testing.

ESN Assure was launched on 9 November 2018 and, together with the emergency services, ESMCP will undertake extensive coverage testing. This will give early sight of any issues and allow both early entry into the gap fix process and build user confidence in coverage availability and performance. Any results obtained will need to consider the maturity of the network delivery in that area.

ESN Products

ESN Assure

ESN Assure is the first ESN product to be made available and was launched in its first phase on 9 November. It will help the emergency services to measure and report on ESN coverage in their area and report on where it needs to be improved.

ESN Assure consists of a package of tools on a handheld ESN device including an app which monitors coverage while on the move as well as offering a view of what areas are predicted to be covered. It also allows users to check Minimised Drive Data from all commercial EE customers in an area to give a more rounded view.

Customers can report any perceived gaps in coverage which will then be reviewed by the programme and suppliers to see if they should have been resolved with contractual commitments or if additional coverage is needed. Coverage gaps that need resolving can then be implemented as part of a future release.

The first phase of this testing involves distributing devices to selected ESN users and was launched earlier this month.

ESN Connect

ESN Connect will be a fast, secure and reliable data connectivity for vehicles, allowing communications from other users to the Mobile Data Terminal in the vehicle (for example, despatch messages) and enabling other devices to tether and connect over ESN.

ESN Connect is a SIM-only offer to connect vehicle Modems with the ESN Data service. It provides a fast, secure data connection on the dedicated network designed for the emergency services. Emergency services customers will benefit from the widest geographical coverage and bespoke service designed to meet their unique needs.

Customers will benefit from data prioritisation, which means the device will perform consistently when using data, even in times of high network traffic. It will also be possible to specify a higher level of prioritisation if needed for any critical applications.

In its simplest form, this is the ESN equivalent of a SIM only data plan. It is for any emergency services organisation that needs a fast, reliable data connection – for example, in-vehicle despatch messaging used by the ambulance service – but does not need the Public Safety Communication Service applications.

ESN Connect+

ESN Connect+ is a SIM-only voice and data plan that provides a fast, secure voice and data connection on the dedicated network designed for the emergency services.

Emergency services customers will benefit from the widest geographical coverage and bespoke service designed to meet their unique needs.

Customers in the emergency services will benefit from data prioritisation, which means the device will perform consistently when using data, even in times of high network traffic. It will also be possible to specify a higher level of prioritisation if needed for any critical applications.

ESN Direct

ESN Direct is a new generation Push-To-Talk and critical messaging product on a smartphone.

It offers earlier access to the new ESN Public Safety application suite, to gain insights into performance and usability, ready to create training and roll-out programmes for wider deployments. It can be utilised by the emergency services and other customers who want to try out the new ESN public safety communications in less-critical scenarios and/or while dual-carrying an Airwave and ESN device.

It also offers an opportunity to test out Control Room integration to ESN, smoothing the path to later upgrades and wider deployments.

ESN Prime

ESN Prime is the fully comprehensive new generation public safety communications service, on a smartphone.

It offers a full suite of public safety communications services including critical voice Push-To-Talk, messaging and video, and is aimed at organisations who are ready to begin the move away from Airwave.

One of the new features it brings is video, which will expand the capabilities of those working in public safety.

ESN Prime incudes critical voice Push-To-Talk, messaging, video, public telephony, messaging and. It also includes interworking and ESN Mobile Device Management (Airwatch).